THE HIGH SCHOOL Journal

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Planning the High School Plant

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The HIGH SCHOOL JOURNAL

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Planning the High School Plant

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The planning of school plants ranks high on the list of "number one problems" in public education today. If the problem could be solved by mere space enclosed by four walls, the answer would be relatively simple. School plants, however, are not mere space. They are complex structures composed of many specialized units designed to facilitate the growth and development of modern youth.

This issue of *The High School Journal* is devoted to many phases of the problem. The articles have been written by men who have had a great deal of experience in the planning of school plants and who are nationally recognized as authorities in the field. They have set up guides for teachers, principals, superintendents, and laymen who are daily called upon for sound, constructive advice in the matter of planning.

Much is at stake. The buildings which are erected today will be determining factors in shaping the educational program for generations. Educators and laymen must enter into community-wide planning to assure school plants which will expedite, not throttle, the educative process. The school plant must be an outgrowth of the total educational plan of a community. *There is no substitute for planning.*

George W. Holmes, III

Planning the Secondary School Plant

W. E. Rosenstengel

THE PLANNING of the secondary school plant is not the work of any one person, but it is the work of many people. The board of education and the superintendent of schools must realize that bringing together the thinking of many people into a workable school plan requires much time and energy.

The administrative staff, the faculty, the pupils, and the parents and patrons should have an opportunity to study and reevaluate the present high school program in light of the changing purposes of secondary education resulting from our changing social and economic life. The secondary school plant must then be planned to meet these changing purposes of public secondary education. The educators must develop for the architect a complete statement of the educational needs. Such a statement should express the objectives to be achieved in the school. For example, if the objectives or purposes of the school include a total community educational program, the building must be designed so the particular part may be used conveniently by the public. If the library is to be as a community library, it should be located near and convenient to the main entrance, so that adults may come and go without disturbing the whole school.

The educational specifications must be clearly stated by the persons responsible for the educational program and then the designer must be able to translate these specifications into space requirements. Among the educational specifications needed, the following must be found:

1. Age groups or grade levels to occupy space.
2. Subjects to be housed in space.
3. Size and location of units such as library, cafeteria, auditorium, homemaking suite, shops, health rooms, offices, etc.
4. Relationship of one unit to another unit.
5. Type and amount of equipment to be used.
6. Amount of storage space required in each unit.
7. The use of newer teaching aids such as radio, television, and motion pictures.
8. The use of water and gas in certain units.

9. The use of home-room teachers or counselors.
10. Extent community will use certain units.

These and numerous other details should be worked out by the administrative officers and the faculty. If the architect does not have such details from the educational people, a poorly adapted school building may be expected.

The selection of the architect is an important task of the board of education and the administration. He should be not only a professional person in design but also a person who knows school plants and knows how to translate educational specifications into the most usable school plant. The architect should have had experience in designing school plants to the extent that he is considered a specialist in this phase of architectural practice. He should have personal characteristics that will permit him to work harmoniously with the school faculty, the board of education, and the administrative officers of the district. The architect's office staff and financial backing should be such that the planning of facilities can proceed on a time schedule appropriate to the plant needs of the district. Last, but not least, he should be a legally qualified architect in good standing in his profession.

In planning secondary school buildings today, it is important that the educators and architects consider expansibility of the building. The U. S. Bureau of Census estimates that the high school enrollment will increase 29.4 per cent by 1960. This means that in some localities the increase will be considerably more, while in others the increase will be less. It is realized that long-time population predictions are not always accurate, but predictions of a short duration of time can be made with reasonable assurance of accuracy. These enrollment trends are essential to planning a schoolhouse so that future additions may be made readily. These future additions should be included in all preliminary drawings. After a building is constructed, its expansion should be possible without the destruction of any of the original space. If the enrollment trends indicate that the building will need an addition in the future, the service systems should be built in the original construction to care for the expansion. For example, the furnace room should be large enough to permit additional boilers if the future addition will demand a larger plant. The plumbing and electric wiring should be of sufficient size to care for the future. In general all pipes, ducts, and wiring required for the future should be included in the initial unit.

Good planning also provides for expansion of a department as well as the entire building. If the commercial department is expected to grow, the initial plans should show provisions for future additions. All divisions or departments of the school should be carefully studied so that future additions may be added with the minimum of destruction and cost.

The changing concepts of secondary education makes it imperative for the school building to be flexible. New subjects will be introduced and new equipment will be made which will affect the teaching. These changes will by necessity demand a change in space requirement. Therefore, the building should be constructed so that the interior walls may be moved to make larger or smaller rooms as the demands may arise. Window arrangements and service systems should be located so that a minimum destruction will take place in alterations. Partitions between rooms should never contain ducts, wiring or pipes.

The designers of buildings must consider the comfort of pupils and teachers. Schools are noisy and nerve breaking. Corridors, classrooms, and all special rooms should be given proper acoustical treatment. Educational activities such as a band or a shop which are noise producing should be located away from central areas. Soundproofing such spaces will also help control the noise. The use of heat controls, convenient location of light switches, toilet facilities, and drinking fountains, will add much to the comfort of a building. Buildings designed to aid pupil circulation or movement will add to the total comfort.

Careful and long-time planning cannot be overemphasized because buildings not only cost money but also determine the kind of education the community will receive. For many communities, the school building represents the greatest amount of money spent by the community on any one project and the secondary school pupils will go through high school but once. Therefore, let all forces, parents, pupils, educators, and designers cooperate in building the best possible building that can be built with the funds that are available.

Site Selection and Development for a Secondary School Plant

ARTHUR MARCUS PROCTOR
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ADVANCE SELECTION OF A SITE

IT IS COMMON practice for school authorities to select a building site after the decision to erect a building has been reached. More recently there has developed in some school districts the attempt to predict future population growth and to plan as far ahead as possible to anticipate future educational needs. Following this procedure, it is possible to select a building site several years in advance of the time when the building will be erected.

Advance selection of a site has many advantages. The chief advantages are: 1. There will be many more available tracts from which to make a selection before the area has been filled with other buildings. 2. The land will be cheaper. 3. It will be possible to secure a larger site. 4. When the planning is done in cooperation with municipal and county authorities, the street and road systems can be planned with reference to the school site. 5. In cooperation with local authorities, zoning ordinances can be drawn to protect the proposed site from enterprises and industries that would likely interfere with the school.

PREDICTING SITE NEEDS IN ADVANCE

For the prediction of population growth there are several usable techniques. Data as to the growth in elementary school population are readily available from the school records. The data, of course, will have to be studied with reference to the trends as shown in each elementary school area separately. In this way the locus of population increases can be fairly well indicated. Another index of population growth may be had by obtaining the record of new building permits from the office of the local building inspector. It is also desirable to consider the cost of dwellings being erected. A new development of high-cost houses will likely be settled by more mature families whose children have already completed high school or are now in high school. On the other hand a low-cost housing development will likely be occupied by newly

married couples or by low income families. In either case the proportion of school children would tend to be much larger than in an area of high-cost housing. Public utility enterprises are constantly predicting population growth for the purpose of extending their facilities. Housing developments will follow the extension of water and sewer lines and of utility services. In predicting the direction of population growth, it is well to obtain information from the utility companies as to their projected extensions.

In selecting the site, due consideration must be given to industrial development and the policies of industry as to labor employment. In the past labor has generally followed the practice of living near the place of employment. In some sections this practice is beginning to change and now many laborers prefer to get out of congested areas, to a place where they can have a kitchen garden, more lot space for a simple cottage, and can live more economically. Industries also are beginning to locate away from congested areas and in some instances furnish transportation busses to collect their workers from a distance.

Location of the Site

A good way to check a proposed site for suitability of location is to make a series of charts or dot maps. One chart can show the location of residences and apartments. This chart will be more useful if the approximate dates of construction of the buildings can be indicated. Such dates will show the trends in growth for the area as well as the location of population density. Another chart can show the pupil distribution. This should be supplemented by school enrollment data, by grades, for the area. These data should be tabulated year by year for a period of about fifteen or twenty years. A third chart would show roads and streets, present and proposed, as well as utility lines, present and proposed.

Formerly it was considered desirable to locate a high school building in or near the geographical center of the territory to be served. In cities, this practice usually resulted in locating the school in the business district where transportation lines converge and where traffic hazards are multiplied. It resulted also in placing the building on a small inadequate lot surrounded by the smoke and noise of factories or other objectionable features. With the development of motor vehicles and the tendency of families to locate their homes away from congested areas, there has been generally a change in popular sentiment. Sites for city high schools are

now more frequently located in suburban areas. In this way children going to school in the morning and coming home in the afternoon will be moving, not with congested traffic, but in the opposite direction. School buildings, also, will be located away from traffic hazards, noises and other objectionable features of the downtown area.

In rural areas the important factor is not the geographical center, but rather such factors as the possible transportation routes, the density of population, and the center of population growth. The site will have to be selected as nearly as possible at a point where transportation will be needed for the minimum number of pupils and will require the minimum time of travel for the pupils to be transported.

THE SIZE OF THE SCHOOL

In both rural and city areas the size of the school is an important factor in determining the selection of the school site. One major problem in the development of a modern high school is that of securing an enrollment sufficient to justify economically, and often to make possible, a comprehensive high school program. Research has not yet determined what is the optimum size for a high school. Certainly a vast majority of the present day high schools are too small to provide an adequate and diversified program, except at a very heavy per-capita cost. High schools of 1200 to 1500 have been and are being operated today very satisfactorily. This range of enrollment makes possible a rather wide curriculum offering at a cost which most communities can meet. A high school of fewer than 300 certainly will restrict the variety of the curriculum offerings and will add considerably to the cost of curriculum expansion.

SIZE OF THE SITE

It is difficult to say what should be the size of the school building site. Space must be allowed for the building or buildings, play area, athletic fields and courts, landscaping, parking of motor vehicles, driveways, etc. In the development of modern high school plants, it has been found desirable to construct special buildings for special purposes, that is, to develop the plant on the campus type plan. In this case the locations of future special buildings should be planned in advance and space set apart for them so that a play court or an athletic field would not have to be destroyed in order to furnish a building site.

In rural communities, except in mountainous terrain, it is usually not difficult to obtain ample and suitable land for a school site. Even in cities, by going to the outer areas, ample site acreage can be obtained. In mountainous country also ample land can usually be secured and, if not altogether suitable, it can be made so by leveling and filling. With the development of modern dirt moving machinery, this is no longer a major expense. For a school of 300 or fewer pupils a minimum usable area of twenty-five acres is desirable. It is important that the area of the site be available for use. It is not uncommon to find a school site of ample acreage but of such terrain that only a small part of the acreage could be made available.

Site Topography

In the high school is focused the educational interest of the community. Frequently community pride leads to the selection of a site on a main thoroughfare where the building may become a landmark to be noted by passing throngs and to be pointed to with prideful boasting by the Secretary of the Chamber of Commerce. It is desirable for the school to occupy a commanding elevation but not for advertising purposes. The site should be well drained and free from gravel and outcropping rock. A clay soil which becomes muddy and sticky in wet weather is not desirable. A sandy loam is the most desirable type of soil. An otherwise desirable site, but with outcropping stone, can be made suitable by blasting out the stone. A clay or gravely site also may be rendered suitable by a covering of a loam top soil.

The site need not be level, but sufficient level areas should be available for play grounds and athletic fields. A site with marked differences in levels and extreme gradients should be avoided. The site, if possible, should blend naturally with the topography of its surrounding area. Particular care should be taken to avoid a site subject to flooding by the runoff of a heavy rain or the backwater of a nearby stream.

Before a site is finally purchased, test borings should be made to determine the nature of the subsoil and underground formations. These tests will show whether there is quicksand or whether a good foundation for buildings can be laid without undue expense.

Developing the Site

After a site has been selected, the first step in its development is to make a contour map showing its various elevations from a

fixed point. From this map the grades and levels to be established can be determined, the driveways laid out, and the location of building determined.

Frequently the maximum utilization of a site has been destroyed by the improper location of a building or buildings on the site. If the site has been properly selected, it should be possible to place the building near the lot line, leaving sufficient space between the building and the road or street for a small lawn, and esthetic landscaping. The major portion of the lot should be to the rear of the building and should be laid out into playing fields and courts, in keeping with the physical education program contemplated. Trees, rocks, and other obstructions in the way of developing playing fields should be removed. Of course, existing trees and other natural attractive features that do not offer obstructions should be preserved.

In grading and leveling processes the problem of drainage should be carefully studied. All drainage lines should be away from the school building. Underground drainage is essential for soil that does not drain readily and for play areas that require rapid drying.

The cost of grading and preparation of the site should be provided in the building budget. If this cost is considerable, it may indicate an unwise selection of site. In grading all top soil should be carefully preserved for use in surfacing the finished ground level. It is often unwise to place a building on filled-in land. The building should have a substantial soil or rock foundation.

In selecting the site it is well to consult a landscape artist. The landscape planner can advise as to the preservation of natural features and the maximum utilization of the site. Certainly the advice of a landscape planner should be sought in the development of the site, the placement of buildings and the layout of walks and drives.

AVAILABLE PUBLIC UTILITIES

The use of such utilities as electric power, telephone service, water and sewer line connections should be given consideration in site selection. In suburban areas, the available water pressure is an important factor. Every modern high school should have electric power and telephone service. In rural areas it is generally necessary to provide a private water supply and sewage disposal. The possibility of obtaining an adequate water supply and of con-

structing a septic tank with an effective drainage basin must be given careful consideration.

Divided Sites

Sometimes a building site has been selected without reference to future expansion. In later expansion, it has been found necessary to cross a road or a street to secure additional ground. This is often a source of accidents as well as inconveniences. Sometimes the road has been crossed by means of an underground passage or an overhead bridge. It cannot be guaranteed that children will always use these means of crossing. Advance selection of a site adequate in area would avoid this hazard.

Site Selection Criteria

This article may be suitably concluded by listing some criteria for site selection and development.

1. The site should be selected, if possible, in advance of the need to erect the high school plant.

2. The site should be located near the center of present and probable future school population, provided an adequate site is available.

3. The site should be selected in cooperative planning with other authorities including planning boards, park boards, library boards and recreation boards.

4. The environment of the proposed site should afford the teachers and pupils (a) safe and healthful conditions; (b) freedom from noises such as heavy road traffic, the operation of railway and trolley systems, fire sirens and factory whistles; (c) freedom from obnoxious odors; (d) surroundings pleasing to the eye.

5. In so far as possible, there should be available public utilities such as water, gas, sewers, electric power, telephone and fire protection services.

6. The size of the site should be determined by the probable expansion of the school and the educational program to be inaugurated. To begin with there should be a minimum of 25 acres to accommodate an enrollment up to 500 pupils. If the enrollment is more than 500, there should be added an additional acre for each 100 pupils.

7. Ideally the contour of the site should be slightly convex with the high point at the position of the building. In relation to adjacent land, the elevation of the site should be sufficient to afford freedom from flooding by severe rain storms and backwater

from overflowing streams. The elevation should also be above the surrounding water table to permit proper subsoil drainage.

8. The site should be selected so as to permit the building to be sufficiently distant from the noises and traffic hazards of roads and streets.

9. The site, if possible, should be so located as to permit multiple uses of play areas in cooperation with other public agencies, particularly recreation boards.

10. The problem of orientation of the building for proper daylighting is now not so important. New structural design lends itself to wide window expanses and skylights in almost any location. Recent more intelligent use of multi-source daylighting has made possible the widening of schoolroom spans and the re-introduction of the "square type" class room. In this way a more adequate visual environment can be provided without too much reference to the point of compass.

Building High Schools for Adaptability and Flexibility

WALTER D. COCKING AND HELEN MERCNER
Chairman of the Board of Editors and Assistant Editor of The School Executive

TEACHERS and students today expect school plants in which they can teach, learn, and live. They have a right to an environment that will be a positive force in the guidance and development of people. Life today they know is complex enough to confuse a young adult unless he has been adequately prepared for it. How can "adequately" be assured? Part of the answer is in learning by doing. This means that the answer is in the high school itself, because it is always the qualifying phrase of curriculum and teaching methods: "if the plant permits." You do not need proof of this if you have ever tried to use modern methods in an old school. If you thought about organizing a science class informally for group activity in a room with fixed desks and Gothic type windows, you knew it would not work. It was not something that could be ignored. The building just was not as flexible as the plan. It would mean cutting down the 35 square foot area William Wayne Caudill says each student needs to ten, the usual area for fixed seat, desk and pupil. So you tried something else or had

the class "pretend." Pretending is a sad imitation of actual performance.

Teachers in four cities out of five in the United States, according to an NEA survey, are hoping that the urgently needed school building projects will be started soon. These projects are in addition to buildings already under construction. Fifteen per cent of the new buildings should be high schools.

The need for high schools at the moment is second to elementary schools which should claim 68 per cent of new construction. If the high schools built now are to meet present needs—already serious enough, they also must be flexible and expandable to meet in less than ten years the influx of the elementary school pupils who were our war babies. For the next decade, $10 billion is the estimated bill for new schoolhouses. High schools' 15 per cent cut of this means $1½ billion. High schools must be flexible and adaptable if they are to be worth this investment.

HOW?

Flexibility is the ability to alter the size of a room, and adaptability is its ability to change with social and educational changes. Educators and architects for over twenty years have been trumpeting for functionalism in school planning that is merely the translation into steel and mortar of John Dewey's philosophy. There is no reason why the same classroom cannot be used for drill in French verbs, a presentation of scenes from "The Merchant of Venice," films of historical events, or double in brass as a satisfactory science classroom, or a place for budding musicians to practice. There is no reason why adult hobby groups could not use it for art or making lampshades or learning Spanish in the evening. No reason, unless it is a traditional classroom.

The one-story school is one very practical answer. It is economically sound, and the safest building that can be provided. This is one time when it is wise to buy a lot of nothing: just space. To enclose this space is a structure of skeleton and skin construction without bearing walls.

To you and me and Johnny that means there are windows instead of walls. Additional rooms for Johnny's sister and her classmates will be easier to attach, if this proves necessary, than in a traditional brick and masonry building. Adaptability is a cinch in such a school.

Interior bearing walls are also eliminated in favor of columns. To divide the juniors from the seniors or the French class from

history, there are lightweight, soundproofed, movable partitions. For the showing of an important film, all partitions can be whisked away to clear the floor for the entire group.

What about the floor? It has risen from the status of dependency and the solitary lot of being walked on. It is the concrete slab covered of course with a suitable surface of wood or plastic, equipped with radiant heating units that supports the building. The whole school, one room or part of a room can be heated if the installation is made with this in mind.

Because this is a one-story schoolhouse, there is no floor space consumed by stairways. (There are other advantages in a one-story structure, too. Safety and less fire hazard are important bonus features.)

Almost as important as the amount of space is the way it is used. Classroom areas are related so that those sharing common facilities, like the library, are grouped together. Cacophonous activities such as band practicing are at the other end of the building in what also might serve as the cafeteria: another "multiple use" of space.

For the greatest freedom and flexibility, the campus plan (a group of small buildings) has been developed. In this way separate units are built for diversified activities. The whole scheme is still based on the one-story building with varied uses of space within each unit. To those who consider this too drastic, there is a happy compromise: the many winged central building. Each unit is self-sufficient with its own washrooms, bulletin boards and activity areas. Proportionate to the emphasis on the schoolroom as a laboratory for experimenting with scientific theories, working in the print shop, practicing the household arts, and learning to live with other people will be the increased use of this plan.

Another phase of adaptability is community use of the school building. This is becoming a more and more popular idea. It is also a necessary one. If there is a need for recreational or activity space for adults after school hours, this school can be used to good advantage. Greater use by the community not only helps the school pay for itself sooner, but it is also good public relations. Perhaps one of the best ideas to consider with adult programs in mind is the winged building. One section or many can be used, because areas can be shut off by flexible gates or movable partitions in the corridor.

This, then, is the flexible school built on an adequate site and equipped with movable cabinets, lockers, shelves, and work benches. Its architecture is determined by the activities which will go on in it. A school that is flexible and adaptable doesn't happen casually. What Samuel M. Holton said in an editorial in the November-December issue is true here: "Careful planning plus flexibility of execution are essential." It is worth the effort to plan a livable school.

Trends in Programs and Designs

PENDLETON MITCHELL
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Georgia State Department of Education

TRENDS in the school program demand change. Changes in curriculum are traditionally slow. But where the needs of individuals are recognized and provisions of means for satisfying them become the concern of those who are responsible for the school program; where understandable objectives are based upon the satisfying of specific needs; where statements of needs and objectives are so clarified that an action program, translating conclusions into a plan of activities and experiences, is made possible and real, there is to be seen a change, assumably for the better. When such things take place in several locations, either independently of one another or in collaboration, one is apt to "discover a trend." Many trends in present-day secondary programs are more generally the shifting of emphasis rather than gross departures from former practice. While much of the argument for a changing curriculum is based upon a refutation of traditional methods and approaches, and may justifiably be so, consequent developments have not always clearly established trends. General practice in the majority of high schools is not significantly different from what it was a quarter of a century ago. Paradoxically, in most high schools there is discernible some *tendency* toward change, and that is significant.

It may be, therefore, that the major trend in high school programs today is a questioning regarding the values and the effectiveness of the program. One's imagination may be called upon to recognize that in the emphasis now put upon human relation-

ships can be found the motivating force for curricular improvement. Some concrete—as well as abstract—evidence of an awareness of relationships is observable, as yet to a far lesser degree in the design of the school plant than in the design of the planned program.

The compelling force of long-known and verbally accepted objectives of education *is* influencing the planning of secondary education. The uniqueness of the individual, the mass of evidence that each individual is different and grows in different ways, for different reasons, and at different rates, enforces the democratic principle of the transcendent position of the human personality. Hence the demands for designed activities and provided opportunities for those experiences for each individual that will secure his optimum growth and development. The importance of the facts to be absorbed and of the skills to be acquired no longer rests primarily upon the value of those things per se; the individual *is* important, his growth is a goal, and knowledge and skills become important as they become usable and useful to him. No one seriously protests the conclusion that the skills are better learned as they become recognized as tools with which a needed task can be performed.

People in America are concerned over the threat which nondemocratic members of the world-family make, by their very character, against democracy. Education is expected to be the saviour of a democratic way of life—while many feel that most of our procedures in schools still omit or negate democratic principles themselves. Here, then, are the two forces: emphasis upon the individual personality, and the shaping of that personality to make positive contribution to the preservation and improvement of a way of life called democracy.

In this sense, there is a trend toward getting democracy into the school. The individual learner, has become, in many instances, the focal point in the program. With painful slowness, guidance is allowed to enter, and planned efforts to help the pupil identify his problems and to think through them—using varied facts and skills—are being made. But few school plants are designed to facilitate guidance activities. Few schools have a place for the counselor to work and to maintain records and materials, and few have rooms which are designed for or suitable for informal conferences. It is possible that a sufficient number do have such facilities to establish a trend.

Problems of the individual as an individual and problems which are his as a member of a group may be attached simultaneously. The development of desirable relationships among individuals should make for the development of desirable characteristics of the individual personality. Group activities leading to group thinking—or resulting therefrom—and cooperative attack upon a common problem are becoming prevalent in schools where growth is earnestly sought. Pupil-planned activities with teacher aid and (so that it may exist) without teacher domination can be found—though rare. Some facilities are provided in some schools —small rooms for club and other group activity; a press room for the journalism group, for the school paper's editor and staff; classrooms so planned that small groups may function, committee work may prosper; libraries that are not morgues.

Larger-group activities find expanded room in some recently planned gymnasiums, lunch rooms and other large areas, where social relationships are improved through living in spacious, comfortable, and attractive environment.

In rare instances each classroom in a school may reveal in its character and appearance what kind of activities take place in it. The classroom can have character, and occasionally does. Most high school students have been "conditioned" to outgrow the urge to express something in creative art or other media. Occasionally, however, one sees evidence of individual and group achievement in such things as murals and models. A few corridors and "lobbies" have become something more than passageways and are so designed to present a setting for an expression of the school's life and character. Displays, bulletin boards—for other than routine notices—pupil art and products of various kinds reflect the kind of thinking and living that characterize the school.

Less of the costly, ornamental decorations and more of an attempt to plan a building from the inside out characterize many of the recent school plants. More often than not, the demand for economy and the actual inadequacy of funds result in the improved design. There are fewer unusable areas and waste spaces; there are more closets, cabinets, and other storage areas. Many toilet rooms are so designed that maintaining cleanliness and sanitation is made simpler, and even attractiveness is achieved. In fact, more buildings are designed to provide attractively safe and healthful environment.

There is a trend toward the more practical and efficient one-story structure, on a school site sufficiently large to accommodate a plant that sprawls if it needs to. Space areas are planned in relation to their respective uses, with those for related activities in natural grouping. Areas used by the community are designed to be readily accessible for community use. Drives and parking areas are provided to facilitate safety and convenient access to the buildings. There is also the commendable tendency to stay above ground. Again, the demand for economy can be turned to good account in avoiding waste and extravagance in costlier design.

It may almost be said that in the school which now makes what was formerly termed the "extra-curricular" activities major vehicles for providing opportunities for learning experiences and provides for them the appropriate spaces and facilities, there will be found the significant trends in both program and school plant design. Until the time comes when all schools reflect an educational program based upon helping learners to recognize and want to do something about their own problems, aiding them in securing all the information available upon the problems, guiding them to draw sequential conclusions, and encouraging and supporting them in actions which may be solutions, many of the potential trends and movements may remain only tendencies or isolated incidents. The final steps of evaluation and re-planning must complete the cycle in program development and also be applied with equal and clear logic to the planning of the school plant.

As the character of the school plant does influence practically all of what goes on in it, provision should be made for planning the program and the school plant concurrently. Flexibility can, and must be a quality of both. One final recognizable trend is seen in the increased attention upon just such planning: the urgent demand of many—heeded by few—that the program must be planned (a good program still does not just happen)—and that the school plant must then be designed to fit the program. To some small degree there is evidence that the efforts toward effective school-program-and-plant-planning have been determinative.

New Design in High School Buildings

ARCHIE ROYAL DAVIS, A. I. A.

THE FIRST major step in acquiring good high schools is to develop good building plans. In the past fifteen years the trend has been toward stringing up unit rooms on straight circulation lines. The old system of design of first making a building outline and then cutting the room patterns to fit, disregarding all elements of orientation, are predated. It is this writer's belief that the return to such a design pattern is impossible. Modern units of the 1950 High School require service lines so much more complicated, and the program for any new high school demands so much more flexibility, that any added complication caused by interlocking room shapes becomes intolerable.

The major change in trend has come from the west coast where in recent years school architects have placed function foremost. Along with this change came the so called "finger plan" in which the standard classrooms branch from trunk corridors. This gives the school flexibility so that all classrooms share the best orientation to sun and air. It allows daylight for all classrooms from the corridor side as well as the main window wall side. It may apply to either single or double "loaded" corridors thanks to new technological developments.

After an adequate site has been procured taking into consideration climate, school enrollment, and expansion the preliminary planning should begin. If the high school is located in a growing town or county area we should give thought to what will take place in growth during the next twenty or thirty years and plan accordingly. There is a trend in some areas toward the "campus plan," a plan which will give extreme flexibility to planning for future growth. This plan for high schools in our Piedmont and Coastal climate could dispense with long enclosed corridors, when desired, and allow pupils to get a nip of fresh air between classes. This would allow segregation of elements of noise, odors, etc., to be isolated so as not to interfere with regular classroom concentration. Shop, music practice, home economics, and the cafeteria, auditorium, and gymnasium could be handled very efficiently in this type plan. This type of design will be a little more costly on

the initial installation. With flexibility in new types of design, when future additions are made the initial cost will be absorbed. The three essential factors in any new school should be light control, air control (both warm and cool) and noise control. With these essentials planned for, the school can easily be made a seat of learning. No pupil can be taught very satisfactorily with any one of these important controls neglected.

The new design should provide adequate light, by both natural and artificial means. The light should be "quality" light and not glare which is so often the case. Good fenestration with glare control of some permanent type should be provided. The teacher in the classroom has responsibilities enough without the continual nuisance of lowering and raising blinds or shades. On dark days when natural light is inadequate, enough—but not too much, artificial light must be provided. There has been a trend recently to over-light some schools. This does almost as much eye damage as inadequate lighting. Quality light doesn't mean fluorescent light. A good uniform light of proper foot candles can be delivered with incandescent lighting fixtures and the administrator should not be "hide bound" to fluorescent lighting which is still in the experimental stages and has its faults.

Each individual area in a high school has its own problem of air control, whether it be warm or cool. Each space should be considered and studied as a unit of the school plan. Sufficient openings in the fenestration or elsewhere should be provided so that each pupil will get his proper amount of fresh, healthy, and unobstrusive breathing conditions. This can be accomplished by means natural or mechanical. The air should be heated in winter by a method which will allow for adequate control; our fast changing weather requires this. Hot water through a convection (not radiant) system gives a better chance of control than any other form of heat transfer. The air of the school not only needs tempering with heat but it also should be kept free of offensive odors. This can be done only by proper planning in site location and location of school elements within the site. By all means segregate cafeteria, shop, home economics, gymnasium and other areas so the student will not have a mixture of objectionable odors from these sources. With this phase of design partially covered the next essential, noise control, should be considered.

Noise segregation is an essential in any good school design but particularly essential in high school design. The gymnasium is a

very noisy and active place. So are the music practice portion of the plant and the shops. Spend plenty of thought in the location of these elements. Exercise the use of acoustic materials. The location of the school site, if possible, should be in an area removed from industrial noise, odors and smoke. Be sure to "back away" from heavily traveled highways and thoroughfares with their noise factors. No pupil can be taught well with any form of noise distraction.

The three elements of consideration in design just discussed—light, air and noise, are all functions of design and the architect should have the cooperation of the school authorities in any criticism of precedent, such as "we want it to face the road and have a portico," and "my kids will be too far from the school house." New schools should above all be a place to educate the child and secondarily monuments to school boards. New design can, if well executed, be handsome, but very few boards have money for both function and embellishment, and so if one had to go, let it be the latter.

There is a trend for designing the school on a single story scheme. Some seem to think it more expensive, but in some instances the cost figures are false, for vertical transportation facility in a high school *is* expensive. By removing this necessity in one story planning (site permitting) costs per classroom are essentially the same. Above all get design first, and then regulate the construction materials so as to balance the cost. Do not sacrifice function. Should the design necessitate the conventional two-story plan that has been in vogue for the last thirty years or more, there is no reason for it to look like a fourteenth century stronghold or the Lincoln Memorial. Proper grouping can give quiet handsome form and with the selection of present-day construction materials, used with good taste, a very pleasing architectural effect can be economically achieved. New design technique in high school building has advanced, it is not just the difference generated by ambition for better environment. Let's put these new techniques in structure, heating and ventilating, lighting, acoustics, audio-visual aids, and special treated areas, to work for the better living of future generations.

Designing the Integrated High School Classroom

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North Carolina State Department of Public Instruction

CLASSROOMS should be planned for the individual child. Students of schoolhouse planning are now agreed that in "Designing the Integrated High School Classroom" the whole effort from the initial step to the occupancy of the completed facility should center around the individual child. It seems reasonable to presume that the excellent teachers in our grammar schools have presented to the school administrators a complete mental and physical record of each child who has completed the elementary grades.

It is only on the basis of the individual child's mental and physical measurements and characteristics, and, indeed his personality, that the good school administrator and the efficient school architect can intelligently begin to plan a modern high school classroom.

Space requirements. The space required for a high school classroom is determined by the psychological, physical and social characteristics of the individual multiplied by the number of students in the class. When these space needs are balanced with the correct factors of light, space and air, the result is an integrated classroom, provided it is in the hands of a competent architect.

High school students are people; people are individuals. We are all familiar with the old saying that "there is only one typical American family, and that the other 40 million families are different from the typical." It may just as appropriately be stated that there is only one typical high school student, and that the millions of others vary in degree from the typical.

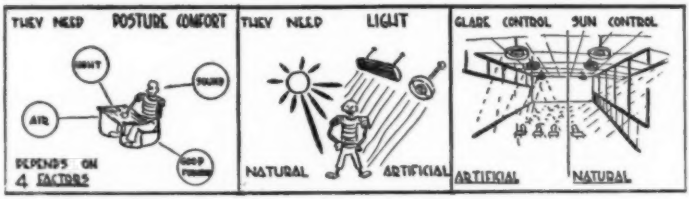
It is impossible for anyone to list, much less to describe, all of the differences in all of the high school pupils who attend a single school, to say nothing of all who attend all of our schools. However, there are certain fundamental principles which should be helpful to the school architect, the school board, or anyone else who would design a high school classroom.

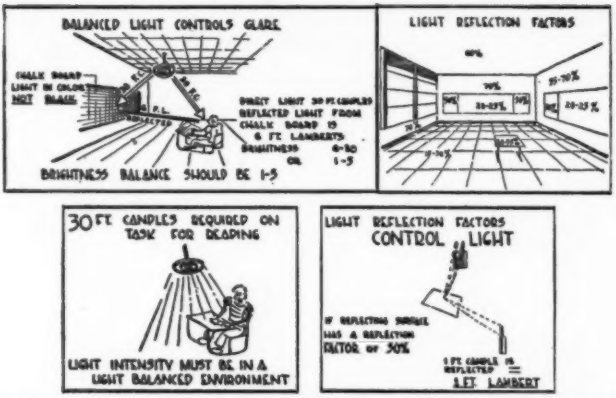
High school students vary in size. Those who would reduce young people who have completed eight grades of elementary work

to tin soldiers, automatons, or robots, will eventually be frustrated in their efforts. High school students are not all alike physically: Girls of the same age vary in size. There is a wide variation in the size between those who are in grade nine and those in grade 12. Naturally, boys, even as girls, vary in size. However, the difference in size between girls, and the difference in size between boys is quite a different problem. The proper desk and seat height for the prim, precise, adolescent girl is quite different from that of the gangling, awkward adolescent boy.

An example of the importance of planning for high school students of varying sizes is illustrated by a fundamental principle in the day-lighting of the classroom. Trained schoolhouse planners are almost unanimous in recognizing that the window sill should be above the line of vision of the pupil seated at his desk. If we are to have esthetically balanced buildings and classrooms, the school administrators must be willing and able to make the simple improvisations necessary to achieve the hygienic objective of this principle for the abnormally sized student. The suggestion is made that the location of the seats, the use of window boards, and the direction that the students are required to face will have a bearing on the solution of this problem.

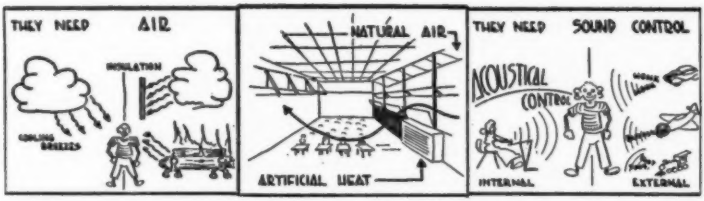
High school students need light. This statement seems almost like a truism, yet the proper amount of light, and the proper balance of light, are fields of study that have received the greatest amount of attention in the past few years. It reflects no credit upon school administrators that for long years they have been apathetically content to let the engineer tell them how much light and how




BALANCED LIGHT CONTROLS GLARE
CHALK BOARD LIGHT IN COLOR NOT GLARE
DIRECT LIGHT 30 FT CANDLES
REFLECTED LIGHT FROM CHALK BOARD IS 6 FT LAMBERTS
BRIGHTNESS 6-30 OR 1-5
BRIGHTNESS BALANCE SHOULD BE 1-5
LIGHT REFLECTION FACTORS
30 FT CANDLES REQUIRED ON TASK FOR READING
LIGHT INTENSITY MUST BE IN A LIGHT BALANCED ENVIRONMENT
LIGHT REFLECTION FACTORS
CONTROL LIGHT
IF REFLECTING SURFACE HAS A REFLECTION FACTOR OF 50%
1 FT. LAMBERT

many foot candles they needed. It is now recognized that the problem of lighting the classroom is not primarily one of the quantity of light, but is rather one of balancing the source of light and the reflecting surfaces in order to achieve an environment for seeing —with the emphasis on the psychological well-being of the individual as well as the protection of the physical nature of the eye itself.

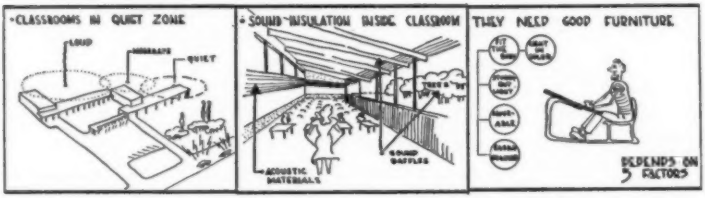
High school students need air. In developing a design program for the ideal classroom, light is only one of the environmental factors. Air ties in with light as the window is also used as a means of introducing cooling breezes in the summer and the solar heat rays in the winter. Solar heat brings with it the problem of glare,



so sun control becomes necessary for ideal visual comfort. The window is also a source of heat loss on sunless days, therefore, careful integration between natural light and natural air on the one hand, with artificial light and artificial air on the other, is imperative for the balanced classroom.

High school students must hear well. The third factor of controlled environment is sound. This problem, basically speaking, is

to differentiate between sound and noise. As far as the individual student is concerned, the sound waves of the human voice are an important part of the learning process. When concentration on one source of sound energy is required, all other audible sounds become disturbing elements and are classified as noise. Desired sound should be amplified by the design of walls and ceiling, but its clarity should be sustained by the controlling factors. The control of internal sound energy in the classroom is an acoustical problem, while protecting the classroom from external noise is a problem of insulation or zoning. The correct location of classrooms for studies requiring intensive concentration is in the quiet zone of the school.



A good site is a prerequisite to good planning. The selection of the site on which the school is to be built has an important effect on proper sound control. The site should be located away from highways, airports, railroads and industrial areas. The school should be located on the site in such a way that it will receive adequate daylight in the classrooms as well as the advantages of cooling summer breezes and yet it should be protected from cold winter winds. Classrooms for social studies should be grouped in a quiet zone around the library, while areas that produce disturbing sounds should be grouped separately.

Summary. The integrated classroom is one that successfully provides a controlled environment for the individual and engenders a good teacher-student relationship. Even though the classroom itself is well designed internally, its complete success as an element of the school plant is dependent upon it being a well related part in the over-all building design. If each element of the building is properly considered in its relationship to other elements and is properly related to the environment, that is to say, the site, light, sound, and air, then the classroom as part of this over-all picture can be said to be an organically integrated unit. This is the goal towards which all efforts in high school planning should be directed.

Heating and Ventilating Services in Secondary Schools

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IN the secondary schools students are expected to develop to a greater degree those ideals, habits, skills, and experiences for which the groundwork was laid in earlier training. It is desirable that each school community attempt to provide and maintain for these students comfortable school homes designed to serve as learning laboratories. Many factors contribute to the development of suitable school homes, but we are concerned here primarily with the heating and ventilating facilities.

IMPORTANCE OF THESE SERVICES. Educators should realize the importance of comfortable environments to student welfare. Modern educational programs should be planned to care for the needs of all eligible students. More students are attending and there is need to give increasing attention to the maintenance of healthful environments for these students. The heating and ventilating systems are important factors in these environments. Stuffy rooms with the air reeking of body odors, overheating or underheating, or too rapid and too extreme temperature fluctuations are not conducive to body comfort or student health protection.

Adequate heating and ventilating service are also important factors in educational progress. In keeping with many other phases of American living we have increased the tempo of our secondary educational programs. The student is offered many learning opportunities and experiences. This rapid program requires concentration on the learning effort. The student who is not alert loses time and position. School time lost and progress delayed are not easily regained. In order to make maximum educational progress the student should be able to live in a comfortable wholesome school atmosphere. Mental alertness may be more easily sustained when the pupil is comfortable.

Adequate heating and ventilating services play an important part in providing school room comfort in either cold or warm climates. Pupils in overheated or poorly ventilated schoolrooms tend to become listless. In a like manner pupil discomfort in under-

heated or poorly heated rooms may decrease learning readiness. Poor heating and ventilating services are costly in terms of pupil health and educational progress.

HEATING AND VENTILATING SYSTEMS. Heating and ventilating systems should be so designed and operated that they provide a comfortable atmosphere for the pupils to be housed in the room. They should supply the heat needed to balance the losses from the human body through radiation and otherwise, and from the room through exfiltration; remove unpleasant body or other odors; prevent rapid or extreme heat fluctuations; diffuse the heat within the room. Adequate heating and ventilating services, then, involve a control of the intake of heat, a control of the exhaust of excess heat, and a control of the air movement, and the quality of the air within the room. There are various factors involved in providing room comfort. Temperature ranges should not exceed accepted limits. These limits vary with individuals, but when handling groups of people in one room these limits should be fixed according to the amount and type of activity in the room. For sedentary activity temperatures from 68° to 72° are satisfactory. For some of the more energetic activities such as may be found in playrooms, temperatures 4° to 6° lower are usually acceptable.

Heating and ventilating systems should have ample capacity to satisfy these objectives. Satisfactory results may be obtained with most types of modern heating and ventilating systems. However, many schools do not have adequate systems. The administrators, custodians, teachers, and others responsible for student welfare should have some knowledge of the principles of room comfort. They should cooperate to develop and maintain suitable facilities for pupil comfort and for desirable working conditions in the room.

TEACHER OBLIGATIONS. The competent teacher realizes that her work is more effective when the students are alert and in a learning mood. Under modern conceptions her task involves many factors and activities pertaining to the welfare of the whole pupil. Her obligations in these areas are as definite as in the teaching of specific subject matter.

It is not necessary for teachers to make special or extensive studies of heating and ventilation. It is desirable that each teacher become familiar with certain principles and practices vital to maintaining comfortable conditions in the room. A general knowledge of certain basic principles and factors such as the following will be of value to her.

Comfort—is a relative term. It varies with individuals and with the same individual at various times and under different conditions. Several factors contribute to a feeling of comfort. The feeling of one individual is an indicator of, but is not an accurate measure of, room comfort for a group of pupils.

Temperature ranges—should be kept within acceptable limits. These ranges will vary with the type of activity carried on in the room. Thermometer readings should be taken at points representative of room conditions and at about pupil breathing levels. Too rapid or excessive temperature fluctuations should be avoided. Each room occupant has his own heating system and radiates body heat into the room. Room temperatures may rise several degrees after being occupied by a group of students. This may be particularly noticeable in auditoriums and other areas where large groups of people are assembled.

Air stratification—should be limited. If room ventilation is not adequate, fan created air turbulence will help mix the room air and diffuse the heat. Air movement should extend to all parts of the room. Variations in temperature from the floor level to a point about 60" above the floor should not exceed 3 degrees.

Drafts—should be controlled. Direct cold drafts on room occupants may be harmful. During cool or cold weather horizontal air flow in excess of twenty-five feet per minute at occupancy levels may have a chilling effect on the students. During warm weather much more velocity may be desired.

Schoolroom ventilating facilities—should be in operation at all times when the room is occupied. These facilities should provide for the intake of adequate quantities of fresh air, the release of foul air, and for circulation of the air in the room. For ordinary classroom activities the introduction of ten to fifteen cubic feet of fresh air per occupant per minute seems sufficient.

Adaptability—to changing conditions is essential. In rooms lacking completely automatic control, the instructor must be responsible for these adaptations. Even in rooms having automatic controls the instructor should check frequently on room conditions.

Room thermometers—provide a measure of room temperatures. They should be so located that their recordings will not be materially affected by drafts, radiators, and hot or cold ducts. In classrooms where pupils are seated thermometers are usually placed thirty to thirty-six inches from the floor, and in shops, corridors, etc., about sixty inches from the floor. An easily read thermometer

with a stand base located on the teacher's desk is desirable. If a string loop is added this thermometer may be used occasionally to check stratification and draft effects.

TEACHER CONTROL. The secondary teacher has a definite responsibility for room comfort. In many rooms she will need to operate the control devices. Even in rooms with automatic controls she should make frequent checks on conditions and report any unsatisfactory conditions which she cannot control. Some of the things she can do in maintaining desirable conditions are:

1. Maintain temperature records. Temperature record charts of hourly readings serve as a check on temperature fluctuations and provide one means of informing the administration and/or the custodian of improvements needed.
2. Limit temperatures to acceptable ranges. If too low call for more heat. If too high cut off heat or increase the ventilation. Learn how to control the vents and the heat outlets.
3. Vary the room temperatures with the activity. If pupils begin a program requiring much physical activity temperatures may be lowered and the ventilation increased.
4. Avoid requiring pupils to sit near radiators or other heat units. If crowded room conditions require seating near such units request radiator shields.
5. Where feasible, air and cool the room when the students are out. Have it fresh when they return.
6. Keep vents open to admit some fresh air into the room at all times when occupied.
7. Keep exhaust ducts open. If none are available, use the transoms.
8. When fresh air is supplied through window openings use window deflectors to shield students from cold drafts. Watch cross room vent openings that might create drafts.
9. Attempt to maintain air movement in the room. Use fans, if necessary to prevent stratification.
10. Watch for room odors. They are indications of inadequate ventilation. They are more easily detected when entering a room after having been in fresh outside air.
11. Watch pupils for drowsiness or listlessness. They may indicate overheating and poor ventilation.

Maintenance of School Floors in the High School

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THERE are several types of flooring and floor covering materials in use in school buildings that may be classified under such major groupings as (1) wood, (2) masonry, and (3) composition (or resilient). The wood floors commonly consist of pine, fir, maple, or oak. Masonry floors include concrete, terrazzo, brick, quarry tile, ceramic tile, and stone, the latter consisting of rough or finished slabs such as marble, slate, and, in some cases, local field stone. Composition or resilient floor coverings include linoleum, cork, asphalt tile, synthetic tile, and rubber.

There is no one single best floor material for all school areas. For best long-term results, floor materials should be selected for the specific areas because of their particular fitness. In making choices consideration must be given to such factors as (1) initial cost, (2) durability, (3) simplicity and cost of repairs, (4) ease of cleaning (daily routine care), (5) resistance to water, or fire, or vermin, or mold, (6) resistance to abrasion or indentation, (7) safety, (8) comfort, (9) quietness—acoustical value, and (10) attractiveness.

Since floor materials vary in their composition and construction and are used under different conditions, there is no one single best plan for taking care of all kinds of school floors. All types of floors require routine daily cleaning such as sweeping, with less frequent wet mopping or scrubbing. Some floors also ought to be given special treatment in the way of a sealer or coating material.

WOOD FLOORS. There is no place for raw untreated wood floors in a school building. A raw floor soils quickly, is not cleaned readily, and is subject to swelling, warping, and eventual shrinking and decay if water is used for frequent cleaning.

Best practice calls for the sealing of wood floors with a penetrating floor seal. This applies to either new or old wood floors, but if a good job is to be done, the floor should be sanded before the seal (a varnishlike material) is applied to the surface the first time. For the original application, two coats of seal are preferable to one, but thereafter an annual *light* application of seal may be

buffed into the surface during the summer vacation period without requiring a further sanding operation. The writer has seen many wood floors in an excellent state of preservation that have not been sanded over a twenty-year period, but have received an annual touch-up with seal.

Floor oil (paraffin oil) has been used to treat wood floors for decades. It is a preservative and helps to hold down dust to some extent, but it is a cheap inadequate treatment that cannot compare with a floor *seal* job. Interestingly enough, this oil does not penetrate into wood deeply and usually can be sanded away very readily, thus preparing the wood floor for an application of the more suitable seal. Many people are agreeably surprised to learn how simple it is to sand and refinish an old dirty oil-laden wood floor.

Liquid wax is used on wood floors, both raw and treated, but it is not an essential treatment. However, wax does add to the attractiveness of the floor, it simplifies daily sweeping, and it serves to preserve the surface of the floor. In a sense, the wax protects the seal that protects the wood.

Water is an enemy of wood and should be used with appropriate caution for mopping and scrubbing. A wood floor treated with a seal, wax, or oil is subjected to less damage than if the floor were raw and untreated. A good penetrating floor seal is by far the best type of preservative against water. Custodial employees, in mopping or scrubbing, should not flood the floor and allow the water to remain on the surface for long periods of time. A minimum amount of water should be used and left on the surface only long enough to soften the soil and to simplify its removal.

ASPHALT TILE. The asphalt tile floor is usually treated with a water emulsion type of liquid floor wax. The spirit solvent type of wax will soften the material and cause it to deteriorate and should never be used with asphalt tile. This type of flooring material is water-resistive and does not suffer the damage true for wood floors. Manufacturers of asphalt tile oppose the use of sweeping compounds that contain oil.

LINOLEUM. Wax is the preferred treatment for linoleum. Since water tends to deteriorate linoleum flooring (and especially the burlap backing) and loosen the bonding cement, care should be taken in mopping and scrubbing to avoid the undue use of an excessive amount.

The cleaning material used as a detergent should be of a mild type, preferably soap. Alkalis that tend to emulsify and destroy

the oil content of linoleum will cause the material to deteriorate over a period of time.

Cork floors are treated substantially the same as linoleum floors.

TERRAZZO. Terrazzo floors may be sealed, preferably with a special water white seal that will not discolor the material. While it is a relatively simple matter to seal new terrazzo floors, old ones can be treated as well, but it is emphasized that before any such sealing the floor should be thoroughly scrubbed several times, if necessary, to remove soil stains, etc. Once a terrazzo floor has been been sealed, there is no way to remove the fixed stains.

While terrazzo floors can be further treated with a water emulsion type of liquid wax, this often results in a slippery condition which is particularly bad in a corridor.

In mopping or scrubbing floors, it should be kept in mind that alkali salts may tend to build crystals in the voids of the floor material over a period of time, eventually resulting in spalling. Mild abrasives in the form of selected scouring powders are used to advantage in cleaning terrazzo and other masonry floors, but rinsing is necessary if a good final appearance is to be achieved.

CERAMIC TILE. Ceramic floors receive no special type of seal or wax treatment and generally are mopped or scrubbed, using a mild abrasive powder in the cleaning solution.

QUARRY TILE. As a rule, quarry tile is cared for in the same manner as ceramic tile, but on occasion a thin seal or wax is applied to the surface to bring out the appearance of the coloring. This treatment, however, has been known to develop a slippery condition which certainly is not desirable for a floor.

RUBBER TILE. Rubber tile must be carefully treated as it is subject to the deleterious effects of oils (found in soaps, seals, and in some waxes and sweeping compounds) and strong alkalis. A water emulsion type of wax may be used. Ammonia is acceptable as a water softener for mopping, along with a number of proprietary branded products.

SWEEPING FLOORS. There are two types of floor sweeping tools in common use: (1) the push broom (floor brush), and (2) yarn mop.

The push broom which comes in several widths such as 14", 16", 18", 24", and 36" may be obtained in different qualities with the brush stock made up of bristle, hair, and fiber. The better brushes contain a substantial percentage of hog bristle. They are more expensive, in first cost, but have a longer life and produce better

sweeping results than other types of cheaper brushes, so generally prove to be a good investment. Sweeping compound may be used with floor brushes, if floors are rough or are badly littered, but the amount of compound used should be held down to a minimum. Indeed, if floors can be swept properly without the use of this material, it should be eliminated.

Yarn mops, lightly treated with an appropriate oil, can be used to advantage in sweeping smooth, well maintained floors, if the amount of litter on the surface is not too heavy. There is no need to use sweeping compound when a treated yarn mop is used for the routine cleaning. If the amount of litter or the floor condition is such that compound must be used, then a brush is the proper tool to use.

There are many types of yarn mops used for this so-called dry mop method of cleaning. A single mop head with strands 8" or 9" long can be inserted in a standard mop stick. This is quite satisfactory for the sweeping of the usual school classroom or office. Corridors and gymnasiums can be cleaned more quickly with a wider yarn mop 36" - 42" in size.

There are two important points to be observed in connection with the use of treated yarn mops for *sweeping*. They should have a *light* application of an appropriate oil to give them the so-called "dustless" effect. An oily greasy mop leaves streaks and results in poor work. Secondly, these mops should be laundered frequently and then retreated before reusing. The frequency of laundering will depend on local conditions and use, but a weekly cleaning may be considered a minimum.

MOPPING AND SCRUBBING. Mopping and scrubbing are called for at intermittent periods if the floors are to be maintained in reasonably clean condition. Since scrubbing is a more laborious process, mopping should be practiced if it suffices to do an acceptable job. With either process it is important to keep in mind that the excess use of water should be avoided. Also, appropriate detergents should be used in the right amounts. Too often, custodians use cleaning solutions so strong that they injure the floor material. Finally, although it involves more labor, a good job of either mopping or scrubbing requires that the floor be rinsed with clear water after the first cleaning solution has been applied and removed.

Classroom Ventilation in the New or Remodeled School Building

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The University of the State of New York

FEAR of the ill-effects of carbon dioxide dominated ventilation standards and practices in this country for years. The standard of 30 cubic feet per pupil per minute minimum air change was established primarily because of this fear.

The carbon dioxide theory was exploded before the turn of the century, but the 30 c.f.m. standard had been incorporated in statutory requirements and to this day still is part of law in some states.

OBJECTIVES OF VENTILATION

It is now commonly accepted that classroom ventilation has two objectives. (The word classroom is used in a restricted sense. Laboratories, shops, kitchens, locker and shower rooms, auditoriums, etc. in which toxic substances or unusual odors may be present, are not included.)

1. Eliminate normal body odors.
2. Provide a proper thermal environment.

Normal body odors are kept below significant levels with fresh air change at the rate of 10 cubic feet per pupil per minute. However, for effective thermal operation in mild weather, a design factor of 15 c.f.m. is desirable. It is not always recognized that a ventilation system often is a cooling agency.

Ventilation standards should be expressed in terms of performance, and the approving agency should have power to approve any type of system which shows promise of meeting the standards.

METHODS OF VENTILATION

There is no one *best* system of ventilation. Some people think of two categories only—window and mechanical. This over-simplifies the problem as window ventilation, that is, window intake, may have mechanical exhaust.

Some engineers will have nothing to do with window intake for fresh air because of its dependence on teacher operation. This is

a fair criticism. We know that at times windows will not be opened and that the room will become smelly and close. But exactly the same thing happens in a wholly mechanical system, but for different reasons. Fans get out of order and are not repaired, fans are disconnected, fresh air grills are covered with card board. These things happen throughout the country in hundreds of schools with mechanical systems.

All in all, one system is as imperfect as the other. Which one shall the school board choose? Probably the best answer to this question is to say that the board should insist upon a *simple system*. We should get away from mazes of duct work, innumerable fans, sometimes for air intake, sometimes for exhaust, sometimes for both, and intricate controls, all of which add up to complicated, expensive systems that frequently are not operated and that in a large measure represent a waste of taxpayers' money.

Following are suggested relatively simple systems.

1. Window intake with exhaust through clerestory windows as is practiced in California.
2. Window intake with fan exhaust from the corridor. The fresh air enters through classroom windows, moves into the corridors, and is exhausted through the roof by means of a fan. The only duct work required is in the roof structure. One or two fans will take care of a classroom wing of average length with a double-loaded corridor.
3. Grill intake below the windows with fan exhaust from the corridor. This system is in little use but is worthy of study and experimentation.
4. Unit ventilator with exhaust from the corridor. This installation is usually made with by-standing radiation. There is considerable evidence that the unit ventilator alone—that it, without by-standing radiation—will take care of both heating and ventilation. The result is large savings in cost of installation and operation.
5. Central fan (zoned) with exhaust from corridor. This system requires few fans but considerable duct work. If exhaust is into the corridor and thence through the roof, the amount of duct work can be held to a minimum. Zoning should be by exposure.

The unit ventilator presents a problem on window sill height. It is desirable to have window sill height at approximately desk height. At present unit ventilators are considerably higher, par-

ticularly in elementary schools. They should be reduced in height. It is not logical to build a window wall around the unit ventilator. The adjustment should be made the other way.

AIR DISINFECTION

Air disinfection is a busy and rapidly moving field of research. Ultraviolet lamps are the most common instrument used. Recent tests made in certain school buildings in New York State by the New York State Department of Health failed to produce conclusive evidence that these lamps prevent the spread of air-borne diseases. If a board of education wishes to install equipment of this sort, it should make sure that the installation is made under the guidance of a competent health official and that the results are carefully checked by him.

Planning the Industrial Arts Laboratory

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SINCE the realization of the objectives of industrial arts education is the reason for having an industrial arts laboratory or shop, it follows that those responsible for the planning of the laboratory—the teacher, the administrator, and the architect—should begin by getting a clear understanding of these objectives.

Our boys and girls should be given the opportunity to study and explore various industrial crafts through the media of tools, materials, and processes in order to provide vocational guidance; develop consumer knowledge and appreciation; give an understanding of and an interest in industrial life; develop skills in the use and care of common tools; and develop avocational interests.

If these objectives are to be realized, the laboratory should be thought of as a place for planning, investigating, experimenting, consulting, and testing, and not merely as a place for making projects with tools and materials. The laboratory must, therefore, be planned accordingly.

Consideration must be given to such factors as (1) class size, (2) space requirements, (3) types of shops, (4) grade level of students, (5) areas to be offered, (6) shop location, (7) shape of shop, (8) auxiliary areas, (9) service facilities, (10) architectural details, (11) safety, and (12) local limitations.

Class size. The maximum class size recommended is 24 students per class. Since industrial arts consists very largely of individual work with students, larger classes are neither desirable nor practical.

Space requirements. The floor area per student will vary with the type of shop organization and with the areas offered. For the general shop as well as the wood, metal, graphic arts, and electric shops, a minimum of 75 square feet per student is recommended, while 125 square feet per student is desirable. For courses such as mechanical drawing and arts and crafts, from 40 to 60 square feet per student is considered adequate. A laboratory designed for operation by one teacher should contain about 3,000 square feet of floor space.

Types of shops. The unit shop organization is a shop or laboratory where a single activity of a division of an industry is taught, such as cabinet-making, welding, or sheet metal. In the general unit shop, one complete field of industry such as general woodwork is covered. This field includes cabinet-making, carpentry, pattern-making, and wood finishing. In the general shop, a number of basic industrial areas are taught in the same shop at the same time by one teacher. This type of shop seems to be the most desirable and feasible for the majority of schools in North Carolina whose enrollment will permit the employment of only one or two industrial arts teachers. It is also the most desirable program for the junior high school.

Areas represented. The manual training shops of the past were limited to narrow programs of woodwork and mechanical drawing which today are not adequate in meeting the accepted objectives of industrial arts. Such a limited program can hardly be justified in terms of exploring the materials and processes of our industrial society. In designing the modern industrial arts laboratory, the following areas should be considered: General drawing, general wood, general metal, general electricity, textiles, graphic arts, transportation, ceramics, plastics, leather, and arts and crafts. The first four should be included in all industrial arts laboratories in North Carolina and others should be added as funds and facilities permit.

Shop location. The manual training shops of the past were often found in basements where the light and ventilation were poor and where the tools and equipment were exposed to excessive moisture. For these reasons the basement is an undesirable loca-

tion for the industrial arts laboratory. If the laboratory is to serve the whole school, it should be placed near the center of the building. With the use of modern acoustical materials, noise is no longer the problem it was in the past.

Shape of shop. The laboratory should be designed from the inside out rather than from the outside in. It should be planned to provide for all of the necessary equipment. It should be rectangular in shape with proportions of 1 to 1½ or 1 to 2, and a width of 30 or more feet. Irregular shapes, such as "U," "L," and "T," should be avoided in order that all parts of the shop may be visible to the instructor.

Auxiliary areas. Areas for (1) a library and planning room, (2) an instructor's office, (3) tool, project, and supply storage, (4) finishing rooms, (5) student lockers, and (6) exhibit and display cases are important auxiliary areas in a well designed laboratory.

The planning and library area should adjoin the shop areas and should be visible from all parts of the laboratory. It should be equipped with bookshelves, blackboard, and tables. The instructor may have an office space in this area unless a regular office is provided.

A tool room or a tool panel centrally located should be provided for all tools. The trend is toward the central tool panel with individual panels for each area in the laboratory.

The storage of supplies for all areas should be concentrated in a central storage room to simplify administration. Also for administrative reasons, the student lockers should be distributed about the laboratory rather than concentrated in one area. Locker space under work benches is recommended.

In wood shops where much finishing is done, a separate finishing room with spraying facilities is desirable.

There should be lighted exhibit and display cases both in the shop and in the corridor of the building.

Service facilities. The laboratory should have both 110 and 220 volts A. C. current with adequate outlets to take care of anticipated needs. Power and light controls should be centralized on a control panel conveniently located.

Gas, compressed air, and hot and cold water should be provided and located where they will be needed.

Washing facilities are essential in both drawing room and shop. One washing position should be made available for each ten stu-

dents. Toilet facilities should be provided in the shop or at least nearby for both boys and girls.

If the laboratory is to be used for adult classes after school hours, it should be heated independently of the rest of the building. The heating units should be so placed as to avoid interference with operations.

The laboratory located on the ground floor should have an outside entrance wide enough to admit cars and trucks.

Light and ventilation are very important factors to consider in planning the laboratory. The recommendations of the Illuminating Engineering Society should be followed in planning the artificial lighting. Their recommendations call for not less than 30 foot candles of illumination at bench height for shop areas, and 50 foot candles at drawing table height for drawing rooms.

Architectural details. Floors should be made of materials which are suitable for their intended use. Avoid concrete when possible, except for hot metal (foundry, forging, and welding), ceramic, and automotive areas. For most areas wooden floors, preferably maple or blocks-on-end, are desirable since they are less tiring on the feet and will not damage tools dropped on them. Linoleum, rubber, or asphalt tile are suitable for drafting, office, textile, and graphic arts areas.

The ceilings and walls should be given acoustical treatment based on the recommendations of an acoustical engineer. The ceiling should be at least 12 feet high. The walls, from the floor up to a height of about 48 inches, should be surfaced with some durable material such as glazed brick, asbestos board, or hard fiber board, which is easily cleaned.

Partitions separating areas, such as planning and drawing, from the main laboratory should be made of wood, metal, or hard board to a height of 42 inches and of glass up to the ceiling or part way up. This is necessary to maintain maximum visibility between areas.

The walls, ceilings, and built-in equipment should be painted with a non-glare paint of high quality. The colors should be based on the recommendations of a color engineer.

The window area of the laboratory should be at least one-fourth of the floor area. The windows should extend from the ceilings down to a point about 48 inches from the floor.

Safety. Safety of the students should be one of the basic considerations in all laboratory planning. It must be considered in

the placement of all hazardous machines and equipment; in the location of service facilities; in providing for the elimination of dangerous fumes; and in the location of aisles of travel.

Planning the High School Auditorium

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THE PLANNING of the high school auditorium is just as important and essential as the planning of the classroom section of the school. In the past, and in too many instances now, the auditorium is considered as a mere appendage to the main structure. From the auditoriums observed in many of the schools, it appears that very little constructive thinking has taken place. This is evidenced by the fact that the auditoriums are merely a place to assemble for special programs and not adequately constructed for even that purpose.

In the light of past experiences with auditoriums, and from information secured from other schoolmen pertaining to auditoriums and their use, the writer believes that there is a need for more study and planning on the part of the architect and schoolman as to the function of an auditorium. The functions will determine to a great extent the architectural design.

An auditorium designed on a functional basis will need to provide the following essentials: (1) adequate and appropriate seating space, (2) adequate acoustical facilities, (3) adequate stage facilities, (4) adequate dressing room space, (5) adequate light, both artificial and natural, (6) adequate ventilation and heating systems, and (7) adequate lobby facilities with rest room facilities for both men and women.

The mere listing of essential needs is not satisfactory without further consideration of each. It is the writer's desire to discuss briefly each of the items listed.

The first essential to be discussed is the size of the auditorium in any school. It is generally agreed that the auditorium should seat the entire student body with additional seats according to the community use and need for such facilities.

In addition to the number of seats available, it is essential that the elevation and seating arrangement be so planned that all may

have an unobstructed view from all sections of the auditorium.

A second important item in planning an auditorium is the acoustical problem. Many auditoriums now in use are excellent examples of poor acoustical planning. In some the acoustics are so bad that the speaker can hardly be heard by the audience in the rear of the auditorium. Such a condition can be prevented if proper advice is secured from an expert engineer who is qualified to advise both the architect and the schoolman.

Under normal conditions the average voice should be audible in the entire auditorium of the average school. However, if the auditorium is very large it may be necessary to install sound facilities and speaker systems to evenly distribute the sound effect to all portions of the area.

The third consideration might be the stage itself. In many auditoriums the stage is far too small. No definite dimensions have been set up for stages, in that the size should be determined by the anticipated use of this facility. A few general suggestions might be made which will assist in planning the stage. The floor space of the stage should be, in the average high school, approximately 750 square feet. This will permit an opening of thirty feet with a depth of twenty-five feet. Such a stage as this will seat a band of 100 or provide space for plays or operettas without crowding the participants to such an extent a good performance cannot be produced.

An important adjunct to the stage is the dressing room and its facilities. Dressing rooms should be provided on both sides of the stage. These rooms should be half as large as the stage itself and should be provided with rest room facilities.

In addition to the dressing rooms as such, there should be adequate storage space on stage level for stage scenery, costumes, and furniture. This room should have an inside and outside opening. The outside opening should have double doors on a level which is accessible to a truck.

A space in itself is not sufficient. This is exemplified over and over in the auditoriums of many schools. To make this space usable it must be properly lighted, heated, and ventilated. Probably the most satisfactory light for auditoriums and stages is the incandescent type. The exact type of fixture will be determined by the use to be made of it. In connection with the lighting system, ample provisions should be made for base receptacles in all areas of the auditorium.

The heating of an auditorium for schools can probably be best done by using the steam system. This provides immediate heat on short notice where radiant heat is slow. However, if the auditorium is to be used rather continuously, radiant heat might be preferred. Regardless of the system used, provisions should be made in the planning to provide heat in the auditorium without heating the remaining portion of the school.

All auditoriums should be provided with an efficient artificial ventilating system. This eliminates the need for so many windows which must be darkened so often if used in daytime. In fact, many architects and schoolmen are designing auditoriums today without windows. This is acceptable in that it is more economical in construction, as well as more economical in maintenance. Such an auditorium will not need elaborate drapes and blinds, which are expensive to install and maintain.

Another feature quite often considered very little is the lobby. Many auditoriums have mere entrances. Such a condition is deplorable. Instead of the door opening into the auditorium, it should open into a lobby. This lobby should be large enough to permit a number of people to meet, pass the time of day, check their wraps, and then proceed to the auditorium. The lobby should be provided with ample rest room and powder room facilities. This is most essential. In fact, the lobby and auditorium should be one of the outstanding areas in a school, since it is visited most often by the average citizen, who in the last analysis supports the schools.

The contour of the land and the elevation of the floor often lends itself to the provision of certain facilities and accommodations under the stage of the auditorium. Such a space could be used for the music department and the school band. This is desirable in that it concentrates the music facilities away from the less noisy school activities. Also, an inside access to the stage and auditorium is possible. This is highly desirable for school programs, as well as public performances.

There are many other problems of interest related to the planning of a functional auditorium. However, to discuss them in detail would involve technicalities which could best be handled by an architect or a specialist in schoolhouse planning, not by the writer, who is only a practical schoolman with some building experience.

Building for Safety

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ALTHOUGH many people think of fire hazards only when considering the subject of safety of school buildings, it is the purpose of this article to stimulate the reader's thinking in terms of the types of hazards.

Fire safety brings up the topic of type of construction, with regard both to ease of exit from the building and to use of noncombustible or slow-burning materials. The more floors the school building has, the more important it is to have very slow-burning or noncombustible materials. It is usually considered safe to use 100 or 125 feet as the maximum distance a pupil should walk to the nearest exit. This will require the spacing of fire wells and exits. It has sometimes been thought necessary to enclose the stairs and have doors at the entrance from each floor or corridor. Some states do not require these doors, but rather a smoke baffle.

Stair safety is very important in the planning of new schools or the rehabilitation of old. All stairs should be of fire-resistive construction, and stair treads should have some type of a non-skid surface.

It is less necessary to have fire-resistant materials in a one-story building, especially if there are exits directly from the classrooms to out-of-doors or if the corridors are single loaded corridors with an exit for each pair of classrooms. This type of construction allows the use of low-cost materials. It is important that no material be incorporated in the school building which gives off toxic gases under combustion.

In order to keep dirt and moisture from corridor and classroom floors, mats are frequently found at entrance ways. These should be recessed to prevent the possibility of stumbling over an edge.

It is difficult to get good floors and keep them well maintained without having them slippery. This is especially true in the presence of snow or water. There are some types of heavy wax compounds which when properly applied can give a reasonably nonslip surface. It is particularly important that cafeteria floors be

nonskid. Linoleum, asphalt tile, and wood floors when properly laid and properly treated work very well in the cafeteria. In providing for safety, maintenance of floors is more important than the type of material used.

Drinking fountains fastened on the walls of corridors, especially when near a corner, provide hazards both to the people who are trying to use them and to people who walk through the corridors. Frequently drinking fountains may be installed in corridor recesses so that the fountain itself will not project into the corridor. It is necessary that each fountain be guarded so that the mouth cannot touch the bubbler and so that the water is projected at such an angle that water touching the mouth of the person cannot fall back onto the bubbler.

The use of the wrong kind of glass in some sections of the school building provides a hazard. All glazed exit doors, fire doors, smoke screens, and fire screens should use wire reenforced glass or tempered glass. Tempered glass does not shatter when broken and usually is broken only by means of changing the stress and strain inside the glass by such means as puncturing with a sharp instrument.

The use of suspended plaster ceilings in school rooms has been in vogue for the last 20 years in some sections of the country. For this purpose, a framework is usually suspended from the ceiling by means of heavy wire. If this wire is not rust-resistive, condensation of moisture can cause a gradual rusting of the wire with a gradual weakening of the ceiling support. If it is necessary that a ceiling be suspended, it is very important that those wires that support the suspended ceiling be of a nonrusting material and properly tested and approved before installation.

Vision safety has a very important place in the planning of a safe school building. This means that lighting fixtures should be installed to give a recommended intensity, perhaps of 25 or 30 foot candles, only after the classroom brightnesses have been brought up to recommended standards.

A rather recent entrant to the field of safety is psychological safety especially in its color implications. Color is usually considered to be either depressing, relaxing, stimulating, or neutral in its effect upon human beings. Of course, we also know that the interpretations of color depend to a great extent upon the type of civilization in which we live. Nevertheless, we should give more

attention to the proper selection of color for the net psychological effect we wish to predominate in any given area.

Most of us are so used to being around electric wiring that we give little attention to the potential danger. It is necessary that all electric outlets, chain pulls, and switches be kept away from sinks and lavatories, and that the lights in the toilet and shower rooms be of the vapor-proof variety.

Many accidents occur in the gymnasium. A great proportion of these occur where pupils without direct supervision or when the teacher's back is turned, do stunts from backboard supports and other types of equipment which are not designed for this purpose.

Not much consideration has ever been given to safety in the office. Nevertheless, many days are lost and suffering has occurred due to the shoving of large steel vault doors upon one's fingers or the shoving of a file drawer back into the file and catching one's fingers. These are only two of the variety of accidents that can occur in the office. It may be that we should have both files and wall doors designed so that they cannot be closed unless the hand is used to push a release.

Providing safety in the shop is a topic by itself. It will have to suffice here by saying that it is very important that wheels, gears, pulleys, belts, reducers, and all connections between a machine and any mechanical drive be properly guarded and that all switches be such that they can be operated only when they are properly enclosed. All cutting, moving, and shearing surfaces should be painted in contrast to the stationary surfaces.

Every school man knows that a large percentage of the accidents in schools occur on the playground. Many of these accidents can be averted. This calls for a much larger playground than we have thought necessary in the past. It is desirable that the playground be subdivided into areas for different age groups, sizes, and activities.

The various safety factors to be considered in the selection of heating plants are too numerous to consider in an article of this type. However, we should hasten to say that there is no need today of having high pressure steam systems for heating school buildings. They are antiquated and frequently become dangerous due to the lack of proper maintenance. If gas or oil is used, we should be sure that they are not allowed to escape into the remote recesses of the building structure to provide explosive mixtures. There have been instances of hotwater tanks exploding or the backing of steam

up into lavatory and shower faucets. It is important that safety valves be installed in such a position that rust cannot collect within the valve and seal the valve shut. The valves should be checked at reasonable intervals, perhaps of two or three months, to ascertain that they are in good working order.

We have tried to give a brief overview of the problems of safety both in planning a new school building, rehabilitating an old school building, and in building maintenance. There are available a great variety of statistics and materials for school officials from the National Safety Council, located in Chicago, Illinois.

The Design of the High School Building of the Future

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TO DRAW a word picture of the high school building of the future without regard to budget, a board member's liking for colonial cupolas, a superintendent's fervent wishes for something he can "sell" his community or a winning football coach's desires in office quarters is to ignore reality. But worse, to think of the high school building of the future without thinking of the high school program of the future, is to court disaster. Too many of our present "modern" high schools are examples of glib, surface rearrangements of the same old spaces in a different format. The planner of the future school building must probe deep into the ferment of educational change on the secondary school level and cause much searching of souls on the part of the professional staff before the "School Building of 19....." takes shape.

Fortunately, limitations of space allow only some random suggestions here and we look into the future to see but a few shadowy shapes. On the other hand, who dares look into the future on a clear day?

Will the "standard" classroom be with us in the future? I think not, yet here we are impaled simultaneously on the two horns of a dilemma. On the one horn, the swelling trend toward the laboratory type program in mathematics, language arts and social studies pushes us toward increasingly greater specialization of spaces. The freshman language arts laboratory, for example, differs greatly

from the senior language arts laboratory. On the other horn, the cost pressure toward standardization of construction elements and the great need for flexibility of construction so that changes in rooms can be made in response to program changes has given us two parallel walls neatly chopped into rectangles. Modification of rooms to meet curricular changes has been something like the periodic rearrangement of living room furniture. It is still the same old living room when you have settled down for a few days.

Perhaps we shall finally resolve that problem allowing irregularity to go forward hand in hand with flexibility. Much salvation will come from movable storage walls, movable platforms, movable acoustic panels; in short, movable elements of a room that can be reshuffled to provide a maximum number of educationally significant combinations. The trick is to achieve flexibility without losing the significance that comes with spaces and equipment specifically designed for a specialized and complex task.

Closely allied with this question of the standardized classroom are the rather searching issues being raised about the size of the class. For some educational situations, the proper class size is one pupil to one teacher. We have heard much about Mark Hopkins on one end of the log. Possibly in the high school of the future we may be able to achieve such a pupil-teacher ratio every now and then. The problem in planning spaces is to provide the equivalent of a log. Probably even Mark Hopkins would have been somewhat taken aback if he had to use two chairs in a high school corridor.

Alternately, it is perfectly possible that certain types of lectures, audio-visual or television programs might take place in a classroom of several hundred students and, as the research shows, with the same educational results as if twenty were in the room.

Standardization of classrooms faces a real challenge in the school that utilizes flexibility of class size to achieve desirable educational outcomes.

The resources of our high school of the future will be rich and varied. For example, our science laboratories will offer a serious and dignified program for the future laboratory cleaner as well as for the future nuclear physicist. Individual research will be possible when the only limitations are in the developing skills and abilities of the student who already is able to construct a model cyclotron or do quasi-original research in bio-chemistry. On the other hand, a vast area of appreciation of science and its social sig-

nificance in the world of tomorrow will be opened for the general student.

Science is but an example. The shops, the interest organizations or clubs, the library, the vocational program, the entire school will be rich in stimuli for those who are given a casual exposure to a field and those who have developed strong interests and abilities in the field already as well as all the gradations in between.

The dignity and importance of the individual student will be recognized in our visionary high school in part by the provisions of spaces where he can cease being a harassed student periodically animated by a program clock and where he can learn to be a social being, part of society and learning to get along on his own among his peers. Student social rooms, dining rooms instead of "gorge and go" cafeterias, offices for student organizations of all types, fences on which he can sit to talk with friends, or, in a few words, some of the amenities of life will be available and the program will provide the time to enjoy them.

The out-of-doors will be part of the curricula of the school of the future. Agricultural programs commonly are carried out in farm-like situations. Science has learned in part to go outdoors. Conservation, soil erosion, the relation between man and his environment, outdoor art classes, experimentation in the greater utilization of the natural resources of the high school region, outdoor music classes, amphitheater for dramatics, outdoor physical recreation for all students are all simple and often practiced manifestations of this trend.

The future high school may have several locations. Some wise educators have suggested that an ideal program should operate successively in a number of different environments. Educational travel and the school camp movement are increasingly important in extending the boundaries of the school to the out-of-doors and in enriching school life by introducing the fresh air of differing environments to students who tend to be disturbingly provincial in a world on wheels and wings.

The high school of the future will utilize its community as a laboratory for study of man. In addition, the high school will utilize the resources of its community, for artisans and artists, bankers and labor leaders, manufacturers and housewives may be temporary members of its staff and the community's houses and shops, stores and governmental facilities used on occasions as temporary laboratories for its program. This involves ample spaces in

the school building in which the ideas and materials gained from the community laboratories and from the "visiting" staff can be nourished and helped to grow in significance.

As the students use the community and its human and material resources to a greater degree, so the community will use the high school and its facilities to an increasing degree. The implications for plant planning are great and immediate. Some of the trends that have not been fully recognized include the great interest on the part of adults in day-time adult education programs, increasing need for short-term, specific vocational training and upgrading programs and joint school-industry apprentice programs.

The barrier between school and community will be lowered and the school building will be planned and designed to be attractive to adults as well as to students.

The high school of the future will intensify its services to the individual. Medical and dental services will increase in significance. Even the physical examination will become a valid diagnostic aid instead of so rough a screening that it is generally a waste of time. The guidance and counseling services will grow and continue to grow in importance which, in this case, means more and more space for records, informal counseling rooms, case conference room and all the appurtenances required when a large staff works in an area.

The school will not discharge a student from its area of interest when the student graduates or leaves high school. It will organize a program for out-of-school youth to carry over the gap until youth gets established, provide counseling and employment service, and even opportunities for social activities. Spaces for this type of development may well be integrated with student social and organization spaces.

The high school of the future will operate in close harmony with the junior college of the community. In some cases, the high school organization may even take on a radically different shape in development with the local junior college movement.

We have—most roughly sketched—a few general possibilities of the high school of the future. These ideas when fully developed provide the problems that architects must solve in planning schools. Those schools will, if the professional educational requirements are clear, have a look that will characteristically differ from the old line high school plant.

In looks, the future high school plant will be scattered on a large site. Sites will vary in size from 50 to 75 acres up, except in crowded urban areas. Sites of this size will usually be located on the fringes of communities rather than in the center of the growing commercial area. The sites will be selected for the variety of natural educational resources that they contain rather than to obtain so many acres of flat land.

Buildings will be naturally grouped on the site and will have a fresh attractiveness to them rather than a forbidding institutional air. The design of the buildings will reflect the use to which the spaces will be put rather than the façade. Art studios will look like art studios rather than converted classrooms. Shops will be shops rather than academic buildings.

One story design will prevail and educational design will supplant monumental design.

Our group has worked on high school buildings that have attempted to meet some of the needs suggested here. Invariably during the planning process, the comment is heard: "I should like to go to high school again in that kind of building." The high school of the future has a formidable task of education ahead of it. The kind of high school building that you would like to attend can do much to assist the program of education for youth in our country in the future.

JOURNAL FEATURES

Editorial

This Issue

The regular staff of the *High School Journal* has been assisted in the preparation of this issue by Professor W. E. Rosenstengel and Mr. George W. Holmes, III.

The Next Issue

The May issue of the *Journal* will deal with problems from the field of the curriculum. It is the assumption of the editorial staff that little progress will be made in our secondary schools without general recognition on the part of all teachers and school officials of the nature of the problems at hand. Recognition alone is how-

ever not enough. General participation in the solution of the problems is the basic step. A magazine which provides a sounding board for criticism, a distribution medium for the results of careful study, and a platform for the exchange of useful information should stimulate competent professional personnel to even more effective effort.

Meeting Pupil Needs

Western thought has been grappling for centuries with the problem of meeting individual needs while maintaining social values. Most of us agree that, whatever Democracy is as a governmental form, its essence as a social philosophy is its stress on the *worth* of the individual. There is in democratic theory a supposition that there can be no real conflict between the interests of different individuals, at least in the social community.

There is still much in American education which can be justified only by *denying* the worth of the individual. Stress on standards is, for instance, frequently a denial of the value of the student. There is the implied statement that standards must be maintained even if individuals suffer. For instance, it is suggested that the mastery of course content is the essential goal of the teacher.

If the worth of the individual is the essence of Democracy then the only defensible standards are those based on that worth. The question becomes not how hard is the program but what does it do for the student. The important emphasis is on *how many individuals profit.*

Lip service is paid Democracy and individual differences. Little has been done about it. It would be revolutionary to insist that each class or school procedure be justified in terms of whether it met the needs of individuals. What is your school doing?

Film Notes

CHARLES MILNER AND KENNETH MCINTYRE

AMERICAN LITERATURES SERIES.* (Biographical films) BENJAMIN FRANKLIN, WASHINGTON IRVING, THOMAS JEFFERSON, JAMES FENIMORE COOPER, HENRY WADSWORTH LONGFELLOW. Released and

* At the present time the films in the AMERICAN LITERATURE SERIES may be rented from Encyclopaedia Britannica Films Rental Library, 3232 East Roxboro Road, Atlanta, Georgia. The University of North Carolina Film Library hopes to have prints of the American Literature Series available by next fall.

distributed by Encyclopaedia Britannica Films, Inc. Five 2 reel, 16 mm., black and white, sound, 20 minutes.

Although these films were produced primarily to be correlated with courses of study in American literature for junior and senior high school English classes, all of them may be used to advantage in American history. To really know and appreciate a man's work, careful reading and assimilation of much of what he wrote is perhaps essential. These films may be used to show how a man's writing was affected by his personality and his environment, and to create a greater appreciation of what he wrote by obtaining a parallel appreciation of the author as an individual.

BENJAMIN FRANKLIN. (Collaborator: Carl Van Doren.)

Portrays highlights in the life of Benjamin Franklin as statesman, scientist, inventor, man of letters. The film dramatizes outstanding events, his early struggles as an apprentice, his scientific experiments, experiences in England and France, and his success as publisher, author, and statesman.

THOMAS JEFFERSON. (Collaborator: Julian P. Boyd, Princeton University.)

Outlines the career of Jefferson by dramatizing incidents that characterize him best. The film includes scenes of the writing of the Declaration of Independence, Jefferson's contributions to social reform, his term as Minister to France, his political campaign for the presidency, and the founding of the University of Virginia.

WASHINGTON IRVING. (Collaborator: Leon Howard, Northwestern University.)

Irving's early life in New York as a lawyer, and then as a writer are shown in this film. His travels and life abroad, emphasizing the incidents on which his best known literary works are based.

JAMES FENIMORE COOPER. (Collaborator: Robert E. Spiller, University of Pennsylvania.)

In this film we see Cooper grow from a young man, dreaming of pioneer adventure on the frontier to a mature, distinguished novelist—putting his earlier dreams into vicarious reality by creating the first great American novels on the American frontier scene.

HENRY WADSWORTH LONGFELLOW. (Collaborator: Howard M. Jones, Harvard University.)

The film describes Longfellow's early love for poetry and his growing, full life as teacher, scholar, and poet. Selections from his

poems, with incidents which inspired him to write several of them, are included.

DIPHTHERIA. Eastman, 1-reel, 16 mm., black and white, silent, 15 min.

This film has been withdrawn from circulation by the University of North Carolina Film Library as a result of outdated inoculation procedures used in the film.

Audio-Visual Suggestions

Frequently teachers are called on to evaluate films for use in the instructional program. Here are some general questions of significance:

1. Does the film contribute to the attainment of worth-while learning goals?
2. Does the film motivate the pupils to further study and activities?
3. Does the film promote more desirable habits and attitudes among the pupils?
4. Does the film give the pupils an authentic learning experience?
5. Do the aesthetic and technical qualities induce an emotional basis for effective learning?

Book Reviews

YOUTH, KEY TO AMERICA'S FUTURE: AN ANNOTATED BIBLIOGRAPHY. By M. M. Chambers and Elaine Exton. Washington, American Council on Education, 1949, 117 pp.

American Youth: An Annotated Bibliography was edited in 1938 for the American Council on Education by Louise Arnold Menefee and M. M. Chambers, and has since served as an excellent listing of sources on youth problems. The present volume brings this bibliography up to date. Two hundred and forty entries are listed under eighteen headings, including such areas as "Adolescence," "Citizenship," "Employment and Vocational Adjustment," "Library Services for Young People," "Negro Youth," "Health and Physical Fitness," and "Youth in Rural America." This work should be of special value to supervisors and principals interested in improving

professional libraries and in finding information relating to specific school problems. To aid these purposes the volume is very well indexed, and contains listings of important youth-serving organizations and publishers of materials useful to teachers of youth.

C. M. CLARKE.

A BIBLIOGRAPHY OF BIBLIOGRAPHIES OF INSTRUCTIONAL AIDS TO LEARNING. Prepared by Elizabeth Findly and Hazel E. Mills. Curriculum Bulletin No. 57, University of Oregon School of Education, July 1, 1949. Mimeographed. 47 pp. (Fifty cents.)

SOURCES FOR FREE AND INEXPENSIVE TEACHING MATERIALS. Prepared by Hugh B. Wood. Curriculum Bulletin No. 58, University of Oregon School of Education, August 1, 1949. Mimeographed. 11 pp. (Fifteen cents.)

Here are three recent bibliographies which seem to be well worth their cost. The first is particularly interesting. Its items are arranged topically, with brief annotations, complete publication data, and prices. The other two bulletins are somewhat less extensive, but offer useful listings of materials sources with coded annotations. Both would have been improved with information regarding the type of organization (i.e., business, public, educational, etc.).

C. M. CLARKE.

THE BUYER'S GUIDE. New York, The Gregg Publishing Company, 1949. 240 pp.

The Buyer's Guide, compiled as a Consumer Education Study, considers the relative merits of important materials which may be purchased in the fields of recreation, health, food, clothing, house furnishings, and a few other general topics. Ping pong balls, bicycles, library books, shoes, even permanent waves are discussed. This book is designed to increase the purchasing power of the student by giving him some facts about goods and services and at the same time teach the technique of wise buying. While it does not make any specific recommendations as to brands or manufacturers, the study does seek to show the correct methods of selection with the best interests of the consumer in mind.

If accepted at the high school level, this book will best be used as a supplement to any course which considers consumer problems; home economics, business courses, or civics. Its facts are interestingly presented with comparative descriptions of various items as well as diagrammatic illustrations. The units of this

book are not dependent on one another but may be used separately or together. Trade vocabulary used by manufacturers in describing their products receives careful consideration and the student is presented an opportunity to see the advertised product stripped of its glitter. At the end of each unit there is a list of sources of supplementary information. The book is paper bound, with good type and format, a valuable aid in some high school work.

WILLIAM L. FLOWERS, JR.

THE INFORMATION FILM. By Gloria Waldron. New York, Columbia University Press, 1949. 267 pp. $3.75.

This report on the information film records the results of a study sponsored jointly by the Public Library Inquiry and the Twentieth Century Fund. It analyzes the procedures and problems involved in producing and distributing the adult information film. Attention is called to the chaotic state of current production and distribution practices with suggestions for correction.

SANFORD S. DAVIS.

FOUNDATIONS OF METHOD FOR SECONDARY SCHOOLS. By I. N. Thut and J. Raymond Gerberich. New York, McGraw-Hill Book Company, Inc., 1949. 493 pp. $4.00.

The authors state that this textbook ". . . has been developed over a period of years in response to a need for new perspective on educational method. . . . [It] seeks . . . to bring about a closer coordination between method and content." (p. vi.) The two authors wrote fifteen of the twenty chapters. The other five chapters were contributed by other members of the School of Education of the University of Connecticut as follows: Chap. 4, The Organization of the School and the Curriculum, by Vernon E. Anderson; Chap. 17, The Teacher as a Counselor, by Dwane R. Collins; Chap. 18, The Concept of Discipline as an Aspect of Method, by William G. Gruhn; Chap. 19, The Teacher Uses Audio-Visual Aids, by David E. Strom; and Chap. 20, The Professional Growth of the Teacher, by Arthur L. Knoblauch.

The book is divided into three Parts: I. Some Factors that Affect Secondary-School Teaching; II. Methods Used by Secondary-School Teachers Today; and III. Some Special Aspects of Secondary-School Teaching.

The authors set the stage for a lengthy consideration of methods of teaching by presenting adequately in Part One the implications for method of the purpose (s) of secondary education and of the

idea of pupil needs. Other factors considered as basic to a discussion of methodology of teaching are (1) the increased enrollments in the secondary schools, (2) the types of curriculum organization and school administration and (3) bases and ways for evaluating the progress of students in school.

Careful attention is devoted to the historical antecedents of modern methods. They call this section the "Method Based on Daily Assignments" (Chap. 6). In this section (of Part Two) they describe the development of the textbook and *memoriter* methods; the monitorial method; the Herbartian four- and five-step pattern (including the inductive and deductive methods of teaching); the influence of the scientific movement in education on method; the platoon system; homogeneous grouping; midyear promotion system; supervised study; the development of better drill techniques; and the development and use of audio-visual aids. From this historical account, the authors decide that these methods eventually came to compose that larger group of techniques known as the *assign-study-recite* method.

In logical order, the book goes into detail (1) in regard to the various ways in which this daily-assignment method has been developed, and (2) in regard to appraisal of pupil progress when the *assign-study-recite* method is employed.

The other sections of Part Two are devoted to methods based upon the teaching unit; they divide these into "Method Based on the Subject-Matter Unit" and "Method Based on the Experience Unit." In discussing and illustrating both types of units they employ the same approach as in the *assign-study-recite* method; they give (1) The Origin and Theory of that type of unit; (2) The Unit in Action; and (3) the Evaluation of pupil progress in that type of unit. These sections are handled well, though the writers run into the difficulty which all of us have, namely, that of how to illustrate clearly the experience type of unit. They explain well preplanning, teacher-pupil planning, and cooperative evaluations.

Part Three contains special aspects of teaching in the secondary school. These six chapters present: (1) the core curriculum; (2) comprehensive pupil appraisal, by the teacher; (3) the teacher as a counselor; (4) discipline and method; (5) the teacher and her use of audio-visual aids; and (6) the teacher's professional growth. All of these chapters are comprehensive and well written and are usually adequately illustrated.

The strong points of the text are its historical accounts of development in methodology, and its wealth of suggestions in regard to appraisal of students and evaluation of teaching. One could wish for a more comprehensive list of audio-visual materials, including the H. W. Wilson Company's *Educational Film Guide* and the Educators Progress Service (Randolph, Wisconsin) series of aids for teachers. But the book is well done. It is a worthy addition to the fast-growing group of newer books on method for high schools. J. MINOR GWYNN.

SCHOOL AND COMMUNITY PROGRAMS. Compiled and edited by Edward G. Olsen. New York, Prentice-Hall, Inc., 1949. 510 pp.

"A casebook of successful practice from kindergarten through college and adult education," this is a compilation of reports on practices illustrative of the ideas expressed in Olsen's *School and Community*. These stories, written by teachers and administrators, furnish realistic information about school-community relationships. The reports are grouped under the following titles: Documentary Sources, Audio-visual Materials, Resource Visitors and Interviews, Field Trips, Surveys, Extended Field Studies, School Camping, Service Projects, Work Experiences, Public Relations, Community Coordination, and Teacher Education. C. M. CLARKE.

HIGHER EDUCATION FOR AMERICAN SOCIETY. John Guy Fowlkes, Editor. Madison, The University of Wisconsin Press, 1949. 427 pp. Price $4.00.

The occasion of the Hundredth Anniversary of the University of Wisconsin was celebrated in part by the National Education Conference held in Madison in 1948. Papers delivered by thirty-eight distinguished educators have been collected and published in the volume. The number of contributors alone will give some idea of the range of interests covered. Purposes, instruction, organization, evaluation, and effectiveness are all treated as the hopes, failures, and problems of Higher Education in America are paraded.

This collection can be used as a source book dealing with different aspects of the general problem. Such separation, although necessary, cries for synthesis which it is hoped the reader will accomplish. As the pieces are put together one is affected by the expressions of dissatisfaction but impressed with the capacity for self-criticism that is evidenced. H. R. ARMOGIDA.